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NAVAL UNDERWATER SYSTEMS CENTER
NEWPORT R I

NORLANT 72 PHASE 2 OPERATION PLAN. (U)
JUN 72

GDS NUSC-TD-4371

ABSTRACT

This document describes the operational aspects of the joint U. S.-Canadian propagation-loss, signal-to-noise, and ocean-chemistry experiments that comprise Phase 3 of NORLANT 72. The command and control organization, event details, schedules of events, communications plan, and geographical data are delineated for the studies to be conducted August-September 1972 in the Labrador Basin and Davis Strait. The Canadian experiment with which NORLANT 72 interacts is called CANUS BAFFIN '72.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF TABLES

LIST OF ABBREVIATIONS

AXBT	Aircraft expendable bathythermograph
CDA	Cross-dipole array
CFAV	Canadian Forces Auxiliary Vessel
COMEX	Commencement of exercise/event
CONGRATS	Continuous-gradient ray-tracing system
CTD/SV	Conductivity-temperature-depth/sound-velocity (probe)
CW	Continuous wave
DREA	Defense Research Establishment Atlantic (Canadian)
FINEX	End of exercise/event
FNMC	Fleet Numerical Weather Central
GMT	Greenwich mean time
IOMEDEX	Ionian Mediterranean Exercise
LDGO	Lamont-Doherty Geophysical Observatory
LRAPP	Long-Range Acoustic Propagation Project
MABS	Moored acoustic buoy system
NAVOCEANO	Navy Oceanographic Office
NFEC	Naval Facilities Engineering Command
NRL	Naval Research Laboratory
NUSC	Naval Underwater Systems Center
NUSC/NL	New London Laboratory, Naval Underwater Systems Center
ONR	Office of Naval Research
PDR	Precision depth recorder
RF	Radio frequency
R/V	Research vessel
S/N	Signal-to-noise ratio
SOA	Speed of advance
SSOB	Senior scientist on board

LIST OF ABBREVIATIONS (Cont'd)

STD	Salinity, temperature, depth (profile)
SUS	Signal, underwater sound
SVP	Sound-velocity profile
TABS	Telemetering acoustic buoy system
USB	Upper sideband
USNS	U.S. Naval Ship
USOP	Undersea Surveillance Oceanographic Project
VLA	Vertical line array
VLAM	Vertical-line-array measuring (system)
XBT	Expendable bathythermograph
Z	Time zone Z (Greenwich mean time)

NORLANT 72 PHASE 3 OPERATION PLAN

I. INTRODUCTION

A. OBJECTIVES

(C) The Phase 3 objectives of NORLANT 72 are to provide and evaluate acoustic and environmental data of the Labrador Basin and Davis Strait with respect to surveillance requirements, including

- Measurement of propagation loss (25 to 1000 Hz), noise (10 to 2500 Hz), and S/N versus depth, versus frequency, and versus geographic location;
- Measurement of the azimuthal directionality of ambient noise; and
- Measurement of environmental parameters as a function of depth in order to permit environmental modeling of the area.

B. ORGANIZATIONS

(U) Office of Naval Research — ONR (Code 102-OS)

Naval Facilities Engineering Command — NFEC (FPO-1)

New London Laboratory, Naval Underwater Systems Center — NUSC/NL

Defense Research Establishment Atlantic, Halifax, Nova Scotia — DREA

C. COMMAND AND CONTROL

(U) The following are primarily responsible for the scientific planning and direction of NORLANT 72 Phase 3:

a. Principal Personnel

U. S. Chief Scientist	R. L. Martin, NUSC
Canadian Chief Scientist	Dr. H. M. Merklinger, DREA
Operations, Logistics, and Oceanographic Data Coordinator	K. W. Lackie, NAVOCEANO
Assistant Oceanographic-Data Coordinator	J. M. Syck, NUSC

b. Principal Investigators

R. F. LaPlante	NUSC (SSOB SANDS)	SANDS acoustic data
Dr. H. M. Merklinger	DREA (SSOB QUEST)	QUEST acoustic data
J. M. Syck	NUSC	Oceanographic data

(U) The Chief Scientists are responsible for overall experiment planning, task assignments for Principal Investigators, coordination of field experiments, and coordination of reporting of experimental results.

(U) The Operations, Logistics, and Oceanographic-Data Coordinator is responsible for administration and logistics arrangements necessary for the various operations of the NORLANT exercise. He will assist the U. S. Chief Scientist in preparation and execution of the technical plan in matters relating to logistics, communications, security, and shore support for the experiment. He will also assist the U. S. Chief Scientist in the planning and coordination of environmental measurements, and he is responsible for the summarizing and reporting of data pertinent to NORLANT 72 Phase 3.

(U) The Principal Investigators are responsible for ensuring that their assigned tasks are carried out and that a preliminary operation report is written within 2 days after arrival in port.

Ship Support

(U) USNS SANDS (T-AGOR -6) will sail under Military Sealift Command orders and will arrange port clearances and logistics support, including agents in St. John's, Newfoundland.

(U) CFAV QUEST will receive sailing orders from Canadian Forces Maritime Command and will arrange port and logistics requirements. The orders will provide for execution of operational and schedule requirements issued by the Director General, DREA.

Aircraft Support

(U) Argus aircraft will be under the operational control of the Canadian Maritime Command.

D. MAJOR EQUIPMENT

(U) Ship and aircraft support requirements are listed above.

Measurement Systems

(U) Moored acoustic buoy system (MABS), NUSC

Telemetering acoustic buoy system (TABS), NUSC

Environmental array, NUSC

Conductivity-temperature-depth/sound velocity (CTD/SV) probe, NUSC

Cross-dipole array (CDA), DREA

Vertical line array (VLA), DREA

E. GENERAL AREA INFORMATION

Daylight Periods at 56° North Latitude (zone time P)

(U)	Date	Daylight Hours	Sunrise	Sunset
	18 July	Always light	0339	2032
	12 Aug	0100 to 2302	0425	1944
	6 Sep	0025 to 2101	0514	1841

Significant Water Depths

(C)	M-1	12,000 ft
	M-2	13,800 ft

Significant Distances

(C)	St. John's to M-1	440 nmi
	St. John's to M-2	360 nmi
	St. John's to Q-2	680 nmi
	St. John's to S-2	440 nmi
	M-1 to M-2	120 nmi
	M-1 to S-5	720 nmi

M-2 to S-5	840 nmi
Q-2 to Q-3	370 nmi
Q-3 to Q-4	80 nmi
Q-4 to Q-5	300 nmi
S-2 to S-3	480 nmi
S-3 to S-4	320 nmi
S-4 to S-5	150 nmi

F. COGNIZANT PERSONNEL

NUSC (Autovon telephone 636 plus extension, commercial 203/442-0771)

(U) R. W. Hasse, x2420 . . . . Overall operation
P. C. King, x2673. . . . . Electronics
R. F. LaPlante, x2429 . . . Overall operation, at sea 19 Aug-7 Sep
R. L. Martin, x2832 . . . . Overall operation
D. D. Abraham, x2643 . . . Overall operation

DREA (Commercial telephone 902/426-3100)

(U) Dr. H. M. Merklinger . . . Overall operation, at sea 19 Aug-5 Sep
J. C. Moldon . . . . . Overall operation
CAPT J. Plaxton . . . . . Aircraft liaison
Dr. J. M. Ross . . . . . Overall operation

II. TECHNICAL PLAN

A. GENERAL

(U) Phase 3 of NORLANT 72 will take place in the Labrador Basin and Davis Strait from 20 August through 9 September 1972. Stations and tracks are shown in figure 1 and listed in table 1. Position M-1 indicates where the environmental array will have been deployed during Phase-2 operations; position M-2 indicates where MABS and the NAVOCEANO environmental array will have been previously

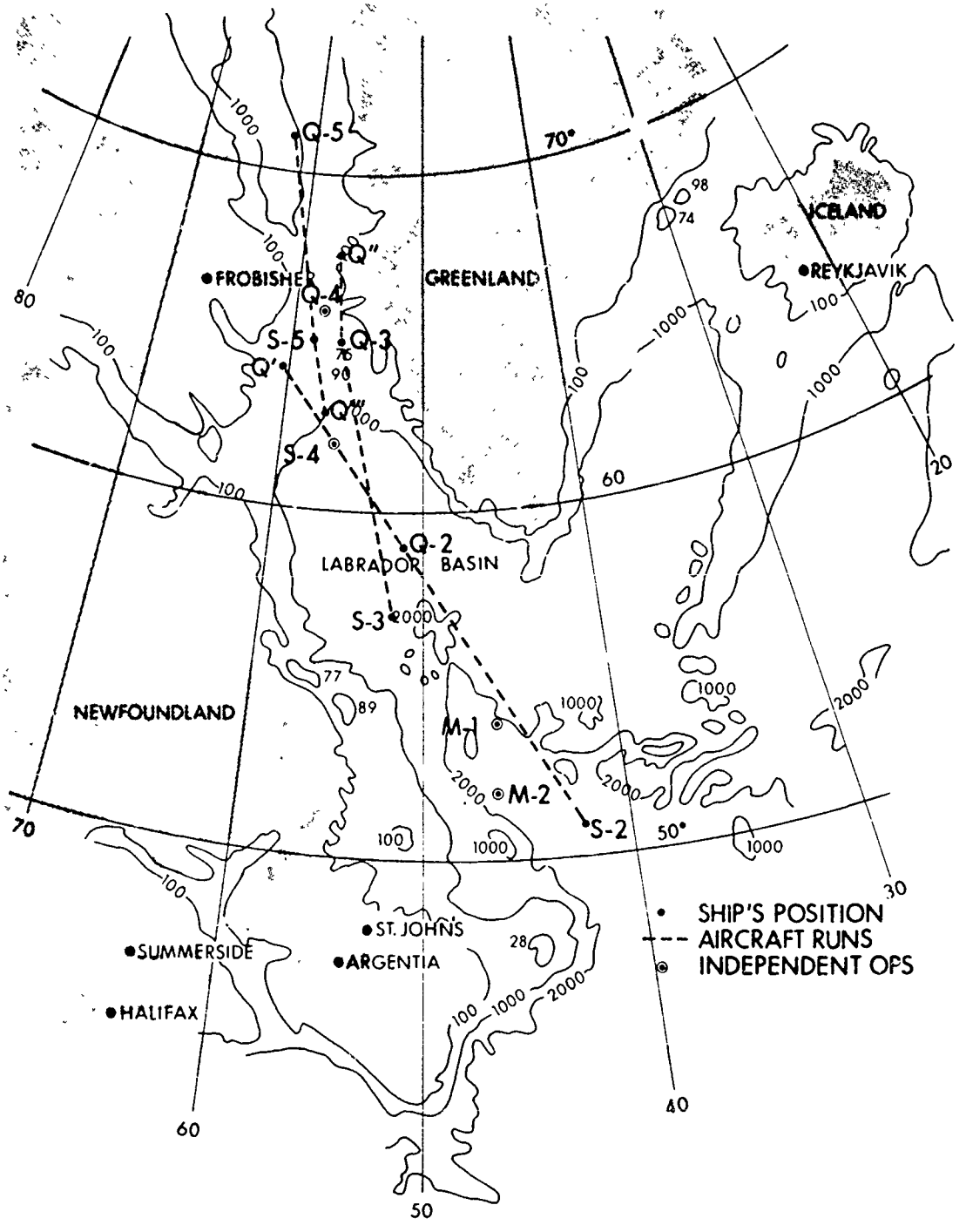

Figure 1. (C) Site, Station, and Track Locations (U)

Table 1. (C) Site and Station Locations (U)

Site or Station	Coordinates	Remarks
M-1	54°N, 46°W	Environmental array (NUSC
M-2	52°N, 46°W	MABS, NAVOCEANO environmental array
Q' Q-2 S-2	64°N, 60°W 59°N, 51°W 51°N, 42°W	Aircraft will traverse from Q' via Q-2 to S-2 and then return over the reciprocal track (570 nmi)
S-3 Q-3 Q"	57°N, 52°W 65°N, 56°W 67°30'N, 56°W	Aircraft will traverse from S-3 via Q-3 to Q" and then return over the reciprocal track (500 nmi)
S-4	62°N, 56°W	Independent Ops
Q-4	66°N, 58°W	Independent Ops
Q''' S-5 Q-5	63°N, 57°W 65°N, 58°W 71°N, 62°W	Aircraft will traverse from Q''' via S-5 to Q-5 and then return over the reciprocal track (320 nmi)

Table 2. (C) Aircraft Flights (U)

Flight Segment	Date	Commence	End	Shot Depth
Q' - Q2 - S2	23 Aug	64°N, 60°W	51°N, 42°W	60 ft
S2 - Q2 - Q'	23 Aug	51°N, 42°W	64°N, 60°W	380 ft
S3 - Q3 - Q"	26 Aug	57°N, 52°W	67°30'N, 56°W	60 ft
Q" - Q3 - S3	26 Aug	67°30'N, 56°W	57°N, 52°W	380 ft*
Q''' - S5 - Q5	30 Aug	63°N, 57°W	71°N, 62°W	60 ft
Q5 - S5 - Q'''	30 Aug	71°N, 62°W	63°N, 57°W	380 ft

*Between start point and QUEST at 65°N, 56°W the shot depth will be 60 ft.

deployed. The stations designated "S-" are those that SANDS will hold during Phase 3, and those designated "Q-" are corresponding positions to be maintained by QUEST. Aircraft shot runs are shown in figure 1 and delineated in tables 1, 2, and 3.

(C) SANDS will deploy the TABS array (hydrophones at 800 and 3000 ft) at each of the aircraft run-stations. SANDS will also deploy sonobuoys with hydrophones at 100 and 300 ft at all stations. QUEST will deploy the CDA for azimuthal ambient-noise-directionality measurements and a 60-ft VLA for propagation-loss measurements at all stations.

B. EVENT DETAILS

TABS

(C) The TABS array will be deployed by SANDS at aircraft drop stations S-2, S-3, and S-5. Hydrophone depths will be 800 and 3000 ft. Data in the 10 to 1250 Hz band will be telemetered to SANDS and recorded on magnetic tape for later processing in 1/3-octave bands to determine propagation loss versus range.

CDA and VLA

(U) The 60-ft VLA and the CDA will be deployed by QUEST during and subsequent to the aircraft propagation runs to obtain propagation loss, azimuthal directionality of noise, and S/N data. Array depths will be 100 ft, and the VLA will have an additional hydrophone suspended at 400 ft.

SONOBUOYS

(C) SONOBUOYS (100 and 300 ft) will be deployed by SANDS at all stations. Ambient-noise data (10 to 2500 Hz) will be telemetered to SANDS and recorded on magnetic tape for later processing in 1/3-octave bands.

MABS and Environmental Arrays

(U) The MABS and environmental arrays will have been deployed during earlier phases of NORLANT 72. These arrays will be retrieved by SANDS upon completion of Phase 3. The recorded data will be removed and forwarded to NUSC for processing.

Table 3. (C) Schedule of Events for Aircraft (U)

Event	Date	Time(Z)	Operation
A01	23 Aug	1300	On station Q'; commence 60-ft shot propagation event Q' to S-2
A02	23 Aug	1800	Complete 60-ft shot event; commence 380-ft shot event S-2 to Q'
A03	23 Aug	2300	End propagation event
A04	26 Aug	1300	On Station S-3; commence 60-ft shot propagation event S-3 to Q''
A05	26 Aug	1700	End 60-ft shot event; commence 380-ft shot event Q'' to S-3
A06	26 Aug	2100	End propagation event
A07	30 Aug	1300	On station Q'''; commence 60-ft shot propagation event Q''' via S-5 to Q-5
A08	30 Aug	1500	End 60-ft shot event; commence 380-ft shot event Q-5 via S-5 to Q'''
A09	30 Aug	1700	End propagation event

CTD/SV Probe

(U) SANDS will conduct a CTD/SV cast to 1000 ft above the bottom at S-2, S-3, S-4, S-5, M-1, and M-2. The data obtained will be used to determine the sound velocity, chemical properties, and pH of sea water as a function of depth.

Aircraft Shot Runs

(U) Canadian Argus aircraft will fly the tracks shown in figure 1 and detailed in table 2, dropping 60-ft SUS charges in one direction and 380-ft SUS charges on the return run. Charges will be dropped at 2-nmi intervals when the aircraft is within 20 nmi of either ship and at 6-nmi intervals when greater than 20-nmi from either ship. Aircraft will adjust ground speed to no more than 180 knots (6-nmi/2-min). Aircraft expendable bathythermograph (AXBT) traces will be taken at 100-nmi intervals on all tracks except that from Q-2 to S-2, where they will be taken at 150-nmi intervals. The received acoustic signals will be recorded aboard SANDS from telemetry outputs of TABS and SONOBUOYS and aboard QUEST from the VLA.

Bathymetry

(U) Bathymetric data will be taken by SANDS and QUEST while in transit between stations. Transit routes will be chosen so that total bathymetric coverage is obtained for tracks flown by the aircraft.

XBTs

(U) SANDS will obtain expendable bathythermograph (XBT) data to 2500 ft every 6 hours while at sea.

(U) Aircraft will drop AXBTs to 1000 ft depth at 100-nmi intervals along each track (except 150-nmi intervals track S-2 to Q-2).

Meteorological and Environmental Data

(U) SANDS and QUEST will maintain an hourly log of meteorological and environmental data, including wind speed and direction, sea state, sea swell and direction, barometric pressure, and temperature.

III. SCHEDULE OF EVENTS

(U) SANDS and QUEST will ensure arrival at their respective stations at least 2 hr prior to the scheduled commencement of an aircraft event and will deploy and check out acoustic receiving systems at least 1 hr prior to commencement of the event. Operations conducted en route to these stations, such as bathymetry, may have to be curtailed in order to meet this requirement.

(U) Event schedules for SANDS, QUEST, and aircraft are shown in tables 3 through 5.

Table 4. (C) Schedule of Events for SANDS (U)

Event	Date	Time(Z)	Operation
S01	19 Aug	2100	Inport St. John's, preparation for Phase 3
S02	21 Aug	1500	Depart St. John's for station S-2
S03	23 Aug	1100	Arrive station S-2; deploy TABS, SONOBUOY, and CTD/SV
S04	23 Aug	1300	COMEX propagation event with aircraft
S05	23 Aug	2300	FINEX propagation; transit to station S-3, and obtain bathymetric data en route
S06	26 Aug	0700	Arrive station S-3; deploy CTD/SV
S07	26 Aug	1100	Deploy TABS and SONOBUOY
S08	26 Aug	1300	COMEX propagation event with aircraft
S09	26 Aug	2300	FINEX propagation; transit to station S-4 and obtain bathymetric data en route
S10	28 Aug	1000	Arrive station S-4; deploy SONOBUOY and CTD/SV
S11	28 Aug	1600	Complete deployment; transit to station S-5 and obtain bathymetric data en route
S12	30 Aug	0800	Arrive station S-5; deploy CTD/SV
S13	30 Aug	1100	Deploy TABS and SONOBUOY
S14	30 Aug	1300	COMEX propagation event with aircraft
S15	30 Aug	2300	FINEX propagation; transit to station M-1

Table 4 (Cont'd). (C) Schedule of Events for SANDS (U)

Event	Date	Time(Z)	Operation
S16	3 Sep	0200	Arrive station M-1; commence ocean-chemistry event
S17	3 Sep	1000	FINEX ocean chemistry; retrieve NUSC environmental array
S18	3 Sep	1600	Complete retrieval; transit to station M-2
S19	4 Sep	0400	Arrive station M-2; commence ocean-chemistry event
S20	4 Sep	1200	FINEX ocean chemistry; retrieve NAVOCEANO environmental array
S21	4 Sep	1800	Complete environmental array retrieval; commence MABS retrieval
S22	5 Sep	0200	Complete MABS retrieval; commence ocean-chemistry event
S23	5 Sep	1000	FINEX ocean chemistry; transit to St. John's
S24	7 Sep	0600	Arrive St. John's
S25	8 Sep		Contingency day
S26	9 Sep	1100	Depart St. John's; transit to New London
S27	13 Sep	1500	Arrive New London

Table 5. (C) Schedule of Events for QUEST (U)

Event	Date	Time(Z)	Operation
Q01	19 Aug	2100	Depart St. John's
Q02	23 Aug	0200	Arrive station Q-2
Q03	23 Aug	1300	COMEX propagation event with aircraft
Q04	23 Aug	2300	FINEX propagation event; deploy CDA and VLA for ambient-noise measurements
Q05	24 Aug	2300	Complete deployment; transit to station Q-3 and obtain bathymetric data en route
Q06	26 Aug	1300	Arrive station Q-3; deploy VLA
Q07	26 Aug	1600	COMEX propagation event with aircraft
Q08	26 Aug	2300	FINEX propagation; deploy CDA for ambient-noise measurement
Q09	27 Aug	2300	Complete deployment; transit to station Q-4 and obtain bathymetric data en route
Q10	28 Aug	1100	Arrive station Q-4; deploy CDA and VLA for ambient-noise measurements
Q11	28 Aug	2400	Complete deployment; transit to station Q-5 and obtain bathymetric data en route
Q12	30 Aug	0800	Arrive station Q-5
Q13	30 Aug	1100	Deploy VLA
Q14	30 Aug	1300	COMEX propagation event with aircraft
Q15	30 Aug	2300	FINEX propagation; deploy CDA for ambient-noise measurement
Q16	31 Aug	2300	Complete deployment; detached from NORLANT 72 Phase 3; conduct independent operations en route Thule
Q17	5 Sep	1300	Arrive Thule, Greenland

IV. COMMUNICATIONS PLAN

(U) Communications will be held to the minimum required to conduct operations. Voice call signs, event numbers, and code words will be used for all radio traffic to provide brevity and security.

Frequency Assignments

(C)	Channel	Assignment	Frequency	Modulation
	1	Primary ship to ship and ship to aircraft	4,477.0 kHz	USB
	2	Secondary ship to ship and ship to aircraft	8,271.6 kHz	USB
	3	Alternative secondary ship to ship and ship to aircraft	16,561.5 kHz	USB
	4	Primary SANDS to shore	13,680.0 kHz	USB

Call Signs

(C)	SANDS	ALTO SAX
	QUEST	BOUNDARY GOLF
	Aircraft (side number)	QUINCY (- - -)

Code Words

(C)	CDA	CHARLIE
	Depth in thousands of feet	DELTA__ DECIMAL__ __ __
	Environmental Array	EDITH
	MABS	MONKEY
	Position (relative to a station)	PETER (reference station) (bearing, °T from reference) TACK (range, nmi from reference)

SUS shot	SIERRA
SONOBUOY (channel__)	BANANA (__)
TABS	TANGO
VLA	VICTOR

Emergency Communications

(U) Plain language messages will be used in the event of an emergency.

Annex A

AIRCRAFT SUS DEPLOYMENT

I. SUS DROPPING PROCEDURE

(U) Aircraft flights will be in accordance with the tracks illustrated in figure 1 and the coordinates given in table 1. In general, SUS will be dropped along the tracks where the water depth is greater than 100 fathoms. Aircraft shot drops will occur every 2 min along the track, starting with the hour mark and eliminating the last two shots of every hour (that is, no drops at 56 and 58 min after the hour) except when within 50 nmi of either ship.

II. TIMING REQUIREMENTS

(U) The primary time reference for the SUS will be the time it is launched from the aircraft. Therefore, the SUS should be released from the aircraft as near the scheduled time as possible and, with care, can be launched to an accuracy of ± 0.5 sec.

(U) The chronometer used for timing the launch sequence should be calibrated at the beginning and end of each flight and the error noted in the aircraft log.

(U) In the event a SUS is not released at the scheduled integral minute, the time early or late in seconds will be recorded next to the scheduled drop time.

III. COMEX AND FINEX TIMES

(U) Aircraft COMEX of SUS drops at 1300Z is desired. If late or early commencement occurs adherence to the even minute schedule and the elimination of the two shots prior to the hour mark is still required. If a break in drop sequence is necessary due to ship traffic in the vicinity, etc., drops will resume on an even minute. COMEX and FINEX times will be logged. Variations or breaks in the dropping procedure, will be recorded.

IV. UNIFORMITY OF SUS SPACING

(U) Once the SUS drops have started, it is desired that the spacing in range be uniform within each leg of a run. It is expected that it will be necessary to adjust speed, course, and altitude of the aircraft in order to meet requirements for navigation, avoidance of weather, and development of maximum range capability.

(U) From past experience, SUS drop runs are successful at altitudes between 1000 and 1500 ft. Aircraft ground speed must be such that SUS spacing is uniform within each leg, but can vary from 5 nmi in some legs to 7 nmi in other legs with the same 2-min interval between drops; where possible, speed should be adjusted so that the distance interval is 6 nmi. To properly reconstruct the SUS drops, all altitude, speed, and course changes must have been recorded when made.

V. AIRCRAFT DELAYS AND RESCHEDULING

(U) Aircraft runs may be delayed by weather or other conditions without notification to the ships by the aircraft commander. If the delay is more than 6 hr the flight will be cancelled and rescheduled for the following day. If the following day's flight is cancelled the event itself will be cancelled.

VI. ENVIRONMENT

(U) During the segment of the flight when SUS are to be dropped, AXBT (AN/SSQ-36) casts are to be made every 100 nmi. These are to be monitored and replaced if a unit is not operational.

VII. NAVIGATION

(U) The following records associated with the navigation of the aircraft runs will be logged and reconstructed as appropriate:

Positions every 15 min, with a workup of data every 45 min,

Altitude,

COMEX and FINEX positions for SUS drops,

Variations from scheduled drop times, and

Detailed track plots based upon all available data.

Annex B

ENVIRONMENTAL DATA PLAN

(U) Environmental data collected by surface vessels and aircraft will be turned over to the Oceanographic Data Coordinator or sent to U.S. Naval Oceanographic Office (Code 7005), Washington, D.C. 20390, as soon as possible upon completion of the exercise. These will include such items as XBT traces, logs, and paper tapes; AXBT traces and tapes; aircraft navigation logs; SVP/STD logs and/or traces; echo-sounder logs; ship navigation logs; meteorological logs; etc. Blank log sheets will be provided to all ships prior to sailing.

(U) All ships will collect pertinent meteorological data every hour; blank log sheets will be provided. All ships will sample sea surface temperature every two hours while underway and tabulate the readings in Sea Surface Temperature Log 3167/71A(3-38); temperatures should be measured by bucket thermometer if possible.

(U) SANDS and QUEST will make XBT drops every four hours while underway with way on as follows: 6000-ft XBT at 0000 and 1200 Z, and 2500-ft XBT at 0400, 0800, 1600, and 2000 Z. While drifting, SANDS and QUEST will make a 6000-ft XBT drop at 1200 Z and 2500-ft XBT drops at 0000, 0600, and 1800 Z.

(U) XBTs are to be coded as outlined in Bathythermograph Log 4167/10A (1-68). All XBT traces are to be identified by ship, position, date, time, and consecutive number, regardless of whether the XBT was good or bad. If any XBT trace is determined by the SSOB to be questionable, another probe should be dropped immediately; this second XBT trace should be assigned a new consecutive number. The maximum depth attained by a T-5 (6000-ft) probe will be reduced by ship speeds above six knots.

(U) Sound velocity or STD cast data will be coded using the HISTD code outlined in the Radio Transmission Log for Salinity, Temperature, Depth, and Sound Velocity Data, 3167/43 (7-68).

(U) SANDS and QUEST will collect continuous bathymetric data while underway. The data should consist of a navigation record of time, latitude, and longitude for each fix and an echo-sounder record of depth versus time. A master log of these two records should be maintained as follows:

Log in book

- Soundings every 5 minutes
- Time (Z) and depth of peaks and valleys
- All course and speed changes with exact (Z) time
- Exact start and stop times (Z) at station and number of station
- XBT, SVP, STD, etc., numbers with exact time (Z)
- All audio checks for scale
- Time (Z) when entering or leaving a port or sea buoy
- Course, speed, and date at top of each page
- All fixes (star, LORAN, satellite, omega, etc.) with exact time (Z).

Log on precision depth recorder (PDR) tape

- All course and speed changes, with event marker
- Scale, time (Z), date, course, speed, and "NORLANT 72 Phase 3" every four hours, with event marker
- Each hour mark scale and time (Z), with event marker

Note 1: Make all marks with felt pen. Print in small letters and as far to the right as possible. Do not write on bottom trace.

Note 2: Leave PDR running once started and phased. Do not adjust it to ship's time; use WWV or CHU signals for rephasing.

(U) A position fix should be made at least every hour and annotated as to type. Echo-sounder log entries should be made at least every 5 minutes, and should be logged as all corrected or all uncorrected depths. Depths can be either fathoms or meters, and times should be GMT for all logs. Electronic or satellite navigation fixes should be accurate to 0.1 min. Abbreviations should be standardized as follows:

c/c	change course	o/c	on course
c/s	change speed	u/w	under way

sta	station	s/o	steady on
a/c	audio check	fms	fathoms
cus	course	kts	knots
spd	speed	dpt	depart

(U) A smooth plot of track-line depths and the original echogram analog records are highly desirable for checking purposes. A plot of deviations from the great-circle track will be made to the same scale as the bathymetric smooth plot of track-line depths. These will be returned to the originating institution when analysis is completed.

(U) The Oceanographic Data Coordinator will review, as promptly as possible after the exercise, the ship and aircraft environmental data obtained for completeness and adequacy for project objectives. The Coordinator will have the data put on punched cards and plotted for editing purposes.

(U) No additional plotting or coding of environmental data beyond that outlined above is required at sea. However, any plots of environmental data made during or after the experiment will have the following formats:

XBT, AXBT, and other data shallower than 1000 m depth will be plotted to the following scales: sound velocity on the abscissa to a scale of 20 m/sec per in.; depth on the ordinate to a scale (left hand) of 100 m per in. for a total scale length of 10 in. (1000 m); the right-hand ordinate scale will be labeled to show each 200 ft.

Composite displays showing each plot of sound velocity versus depth (for a given location) at a position along the abscissa that indicates the time at which it was taken will have a time scale of 10 hr per in. along the abscissa.

Preliminary bathymetric-profile diagrams are required to have a horizontal scale of 20 nmi per in. reading from west to east and a vertical scale of either 500 fathoms per in. or 1000 m per in.

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TD 4373 is Scientific Plan	Department of the Navy

13 ABSTRACT

This document describes the operational aspects of the joint U. S.-Canadian propagation-loss, signal-to-noise, and ocean-chemistry experiments that comprise Phase 3 of NORLANT 72. The command and control organization, event details, schedules of events, communications plan, and geographic data are delineated for the studies to be conducted August-September 1972 in the Labrador Basin and Davis Strait. The Canadian experiment with which NORLANT 72 interacts is called CANUS BAFFIN '72.

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DD FORM 1 NOV 68 1473 (PAGE 1)

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KEY WORDS	LINK A		LINK B		LINK C	
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ocean chemistry						

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DEPARTMENT OF THE NAVY
OFFICE OF NAVAL RESEARCH
875 NORTH RANDOLPH STREET
SUITE 1425
ARLINGTON VA 22203-1995

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Report Number	Personal Author	Title	Publication Source (Originator)	Pub. Date	Current Availability	Class.
IR 71-2	Fenner, D. F., et al.	SOUND VELOCITY AND BOTTOM CHARACTERISTICS FOR LRAPP ATLANTIC AREAS I, II, AND III (U)	Naval Oceanographic Office	710601	ADC008372; ND	U
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Unavailable	Anderson, C. G., et al.	ADAPTIVE BEAMFORMING ANALYSIS FOR DIRECTIONALITY USING DATA FROM A VERTICAL ARRAY IN THE MEDITERRANEAN	Naval Undersea Research and Development Center	710901	AD0517696	U
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